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RESEARCH AID

2

SPECIFICATIONS
FOR SELECTED PETROLEUM PRODUCTS
IN THE USSR



ORR PROJECT 25.193

(Part II)

5 February 1955

CENTRAL INTELLIGENCE AGENCY

OFFICE OF RESEARCH AND REPORTS

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FOREWORD

The compilation of specifications presented in this research aid covers selected petroleum products in the USSR. It provides, in convenient form, the technical descriptions of the most commonly used petroleum products according to translations from Tekhnicheskiye normy na nefteprodukt (Technical Norms for Petroleum Products), Moscow, 1952.

No formal coordination has been sought, as this information consists of translations from available source materials, and the project has been discussed with others in the intelligence community.

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SPECIFICATIONS FOR SELECTED PETROLEUM PRODUCTS
IN THE USSR

I. Introduction.

This research aid presents USSR technical standards covering a selected list of petroleum products. These specifications have been extracted from Tekhnicheskiye normy na nefteprodukt (Technical Norms for Petroleum Products), Moscow, 1952, which represents the latest data of this type available to the intelligence community. The full table of contents of this document appears in the appendix as a reference for further exploitation.

The products described in this research aid include those that are most important and most commonly used: aviation gasoline, motor gasolines, kerosines, diesel fuels, boiler fuels, and certain lubricating oils. Additional information on standards of other petroleum products such as lubricating oils, greases, asphalts, products of pyrolysis, petroleum coke, carbon black, and the like, can be found in the Soviet publication mentioned above.

These data are presented as a research aid, to be used in the evaluation of the status of the Soviet petroleum industry and the determination of technological and economic trends resulting from petroleum developments in the USSR.

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II. Technical Standards in the USSR.

A. General.

All information contained in the explanatory notes for the various products following has been extracted from the textual data in Tekhnicheskiye normy na nefteprodukt, Moscow, 1952.

The identification of the known abbreviations preceding the specification numbers is as follows:

GOST - State All-Union Standard

OST - All-Union Standard

TU - Technical Specification

VTU - Departmental Technical Specification

B. Aviation Gasolines and Jet Fuel.

1. Explanatory Notes.

According to Soviet standards there are two basic types of aviation gasoline in the USSR:

a. Those types of gasoline which are produced by straight-run distillation and combination with various high-octane components.

b. High-octane gasolines, the basic component of which is catalytically cracked gasoline and which contain a high percentage of iso-paraffin and aromatic hydrocarbons.

A special group of gasolines includes those containing an admixture of "ekstralin." The basic gasoline for the manufacture of these types of fuel is straight-run gasoline B-70. Gasoline with ekstralin is manufactured in two kinds, BE-92 and BE-95/130. To obtain the latter type, about 20 percent iso-octane is added to the basic gasoline.

General comments on aviation gasoline manufacture:

a. Low-octane gasoline B-70 is used in a pure state.

b. B-89 is produced by the ethylation of B-70.

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c. B-95/130, B-95/115, and B-92/120 are produced mainly by a mixture of straight-run gasolines with iso-paraffins and a mixture of high-grade aromatics added.*

* Continued on p. 5.

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CONFIDENTIAL2. Index to Technical Standards for Aviation Gasolines.

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Aviation Gasoline	GOST 1012-46	B-95/130 Baku	
"	"	B-95/115	
"	"	B-92/120	
"	"	B-89	
"	"	B-70	May contain reformed gasoline. May contain reformed gasoline.
Aviation Gasoline (Catalytic)	GOST 3784-48	B-100/130 B-95/130	
Aviation Gasoline (with Ekstralín)	GOST 3737-47	BE-92	Intended for current use; not to be stored more than 6 months.
"	"	BE-95/130	Intended for current use; not to be stored more than 6 months.
Aviation Gasoline	GOST 5760-51	BA	
High-Octane Component	GOST 4095-48	Technical Iso-Octane	Blending agent used in preparation of high-octane aviation gasoline.
	VTU-251-48	Technical Alkyl Benzol	Blending agent used in preparation of high-octane aviation gasoline.
Standard Fuel	GOST 4374-48	Standard Iso-Octane	Reference fuel for evaluating octane rating of gasolines.
	GOST 4375-48	Standard n-Pentane	Reference fuel for evaluating octane rating of gasolines.
Jet Fuel	GOST 4138-49	T-1	Only known specification for jet fuel; extracted from ATIC Study No. 102-AC-53/6-34. Does not appear in these standards.

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USSR Technical Standards for Aviation Fuel a/* - 1952

Specification	GOST 1012-46			
	B-95/130 Baku	B-95/115	B-92/120 b/	B-89 B-70
Ethyl fluid (grade R-9), ml/kg (max)	4 c/	4 c/	4 c/	0
Octane Number (lean) (min)	95	95	92	70
Unleaded	130	115	120 b/	89
Leaded				
Octane Rating, Rich Mixture (min)	40 (104) d/	40	40	40
Distillation, °C	82 (180) d/	82	88 (190) d/	88
IBP (min)	75 (167) d/	75	75	75
10% (max)	105 (221) d/	105	105	105
40% (min)	145 (293) d/	145	145	145
50% (max)	180 (356) d/	180	180	180
90% (max)				
97.5% (max)				
Total Residue and Loss, % (max)	2.5	2.5	2.5	2.5
Residue, % (max)	1.5	1.5	1.5	1.5
Reid Vapor Pressure, mm Hg (max)	330 (6.4) e/	360 (7.0) e/	360	360
Acidity, mg KOH/100 ml (max)	1.2	1.2	1.2	1.2
Freezing Point, °C (max)	-60 (-76) d/	-60	-60	-60

* Footnotes follow on page 7.

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USSR Technical Standards for Aviation Fuel a/ - 1952 (continued)

Specification	GOST 1012-46			
	B-95/130 Baku	B-95/115	B-92/120 b/	B-89 B-70
Iodine Number, g/100g (max)	10	10	15	15
Gum, mg/100 ml (max)	2	2	2	2
Sulfur, wt % (max)	0.05	0.05	0.05	0.05
Copper Strip Corrosion Test	-----	-----	Must Pass	-----
Water-Soluble Acids and Alkalies	-----	-----	None	-----
Mechanical Impurities and Water	-----	-----	None	-----
Transparency	-----	-----	Clear	-----
Color	-----	-----	Unleaded fuel must be colorless	Colorless

- a. These fuels are produced by straight-run distillation and combination with high-octane components.
 b. Change which became effective on 4 February 1952.
 c. Equivalent to 5.6 ml TEL/US gallon.
 d. Temperature in °F.
 e. Pressure in lbs/in².

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USSR Technical Standards for Aviation Fuel - 1952

Specification	Catalytic GOST 3784-48 B-100/130	With Ekstralalin GOST 3737-47 BE-92	BE-95/130	GOST 5760-51 BA
Ethyl Fluid (grade R-9), ml/kg (max)	3.3 a/*	4.0 b/		3.3 a/
Octane Rating, Leaded				
Lean Mixture: 1-C method	100	92		
Motor Method	98.6		95	
Rich Mixture: 3-C method	130	130	130	
Distillation, °C				
IBP (min)	40 (104) d/	40	40	40
10% (max)	75 (167) d/	88 (190) d/	88	75
40% (min)	75	75	75	75
50% (max)	105 (221) d/	105	105	105
90% (max)	145 (293) d/	145	145	145
97% (max)	180 (356) d/	180	180	180
Sum. of 10% and 50% points, (min)	135 (275) d/			135
Total Residue and Loss, % (max)	3.0	2.5	2.5	2.5
Residue, % (max)	1.5	1.5	1.5	1.5
Reid Vapor Pressure, mm Hg (min)	240 (4.6) e/			240
Reid Vapor Pressure, mm Hg (max)	360 (7.0) e/	360	360	360
Acidity, mg KOH/100 ml (max)	1.2	1.2	1.2	1.2

* Footnotes follow on page 9.

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USSR Technical Standards for Aviation Fuel - 1952 (continued)

Specification	Catalytic		With Ekstralalin		GOST 5760-51 BA
	GOST 3784-48	B-95/130	GOST 3737-47	BE-92	
Freezing Point, °C (max)	-60 (-76) d/	-60	-60	-60	-60
Gum, mg/100 ml (max)	2	2	2	2	2
Sulfur, wt % (max)	0.05	0.05	0.05	0.05	0.05
Iodine Number, g/100g (max)		15	15	15	6
Cloud Point, °C (max)					-50 (-58) d/
Copper Strip Corrosion Test			Must Pass		
Water-Soluble Acids and Alkalies			None		
Mechanical Impurities and Water			None		
Transparency			Clear		
Color	Dependent on color of ethyl fluid		Colorless (before ethylating and adding ekstralalin)		Dependent on color of ethyl fluid
Heat of Combustion, Cal/g (min)					10,400

- a. Equivalent to 4.6 ml TEL/US gallon.
 b. Equivalent to 5.6 ml TEL/US gallon.
 c. Weight percent of ekstralalin (in lieu of ethyl fluid) - established by order No. 210 of 24 April 1951.
 d. Temperature in °F.
 e. Pressure in lbs/in².

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USSR Technical Standards for Aviation Fuel - 1952

Specification	High-Octane Components		Standard Fuels	
	GOST 4095-48 Technical Iso-Octane	VTU 251-48 Technical Alkyl Benzol	GOST 4374-48 Standard Iso-Octane	GOST 4375-48 Standard n-Pentane
Octane Rating				
Leaded with max. of 4.0 ml/kg R-9 fluid a/*	104	99		
Distillation, °C				
IBP (min)	40 (102) b/	105 (221) b/		
10% (max)	82 (180) b/	120 (248) b/		
50% (max)	115 (239) b/			
90% (max)	150 (302) b/			
97.5% (max)	180 (356) b/	180		
Total Residue and Loss (max)	2.5	2.5		
Residue (max)	1.5	1.5		
Reid Vapor Pressure, mm Hg	360 (7.0) c/			
Acidity, mg KOH/100 ml	1.2	1.2		
Iodine Number, g/100g (max)	10	10		
Gum, mg/100 ml (max)	2	2		
Sulfur, wt % (max)	0.02			
Specific gravity (d 20) (min)		0.860		

* Footnotes follow on page 11.

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USSR Technical Standards for Aviation Fuel - 1952 (continued)

Specification	High Octane Components		Standard Fuels	
	GOST 4095-48 Technical Iso-Octane	VTU 251-48 Technical Alkyl Benzol	GOST 4374-48 Standard Iso-Octane	GOST 4375-48 Standard n-Pentane
Freezing point, °C (max)		-60 (-76) b/		
Copper Strip Corrosion Test		----- Must Pass -----		
Water-Soluble Acids and Alkalies		----- None -----		
Mechanical Impurities and Water		----- None -----		
Transparency		----- Clear -----		
Color		Colorless		
Appearance				
Density @ 20°C (d 20)			0.6918-0.6923	0.6833-0.6844
Refractive Index @ 20°C			1.3914-1.3920	1.3877-1.3887
Boiling Range, °C			99.1-99.5	98.2-98.6
Unsaturated Hydrocarbons			----- None -----	----- None -----
Sulfur, wt% (max)			0.008	None
Octane Number			100 + 0.1	0.0 + 0.2
Sediment			----- None -----	----- None -----

a. Equivalent to 5.6 ml TEL/US gallon.

b. Temperature in °F.

c. Pressure in lbs/in.².

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USSR Technical Standards for Jet Fuel - 1952

Specification	GOST 4138-49	Specification (continued)	GOST 4138-49
Density, ($\frac{d}{4}$ 20)	0.800-0.850	Kinematic viscosity, centistokes	1.8-3.0
Freezing Point, °C (max)	-60 (-76) <u>a/</u>	(a) At 20°C (68) <u>a/</u> (max)	4
Cloud Point, °C	-50 (-58) <u>a/</u>	(b) At 0°C (32) <u>a/</u> (max)	16
Gum, mg/100 ml	8	(c) At -40°C (-40) <u>a/</u> (max)	25
(a) At refinery	11	(d) At -50°C (-58) <u>a/</u> (max)	25
(b) At point of consumption	30 (86) <u>a/</u>	Aromatic Content, % (max)	1.0
Flash Point, °C (Pensky-Martens- closed cup) (min)	0.1	Acidity, mg/KOH/100 ml (max)	2
Sulfur, wt % (max)	150 (302) <u>a/</u>	Iodine No., gm/100 gm (max)	0.005
Distillation, °C	175 (347) <u>a/</u>	Ash Content, % (max)	None
IBP (max)	225 (437) <u>a/</u>	Mechanical Impurities and Water	None
10% (max)	270 (518) <u>a/</u>	Water-Soluble Acids and Alkalies	
50% (max)	280 (536) <u>a/</u>		
90% (max)	2.0		
98% (max)			
Residue and Losses, % (max)			

a. Temperature in °F.

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C. Automotive Fuels.

Index to Technical Standards for Automotive Fuels

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Automotive Gasoline	GOST 2084-51	A-66	Intended mainly for automobile engines of older types, which have a low degree of compression (4.5) = GAZ-AA, M-1, ZIS-5, ZIS-16, etc.
	"	A-70	For use in automobiles of newer types, which have engines with a high compression ratio (5 and above): ZIM "Pobeda," GAZ-51, ZIS-150.
	"	A-74	Intended especially for automobile engines of type ZIS-110. This is a straight-run gasoline; used without antiknock compounds.

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USSR Technical Standards for Automotive Fuel - 1952

Specification	GOST 2084-51		
	A-66	A-70	A-74
Ethyl fluid, ml/kg (max)	1.5 a/	1.5 a/	Nil
Octane Number (min)			
Leaded	66	70	74
Unleaded			
Distillation, °C			
IBP (max)	79 (147) b/	79	35 (95) b/
10% (max)	145 (293) b/	145	70 (158) b/
50% (max)	195 (383) b/	195	105 (221) b/
90% (max)	205 (401) b/	205	165 (329) b/
FBP (max)	4.5	4.5	180 (356) b/
Residue and Loss, % (max)			
Residue, % (max)	1.5	1.5	2.5
Reid Vapor Pressure, mm Hg (max)	500 (9.7) c/	500	1.5
Gum, mg/100 ml (max)	10	10	500
Induction Period, Minutes (min)	240	240	2
Sulfur, wt. % (max)	0.15	0.15	800
Copper Strip Corrosion Test	-----	Must Pass	0.1
Water-Soluble Acids and Alkalies	-----	None	-----
Mechanical Impurities and Water	-----	None	-----
Acidity, mg KOH/100 ml (max)	3	3	2
Iodine Number, g/100g (max)	-----	No standard	10

a. Equivalent 2.1 ml TEL/US gallon.

b. Temperature in °F.

c. Pressure in lbs/in².CONFIDENTIAL

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D. Illuminating Kerosines and Naphtha Solvents.

1. Explanatory Notes.

Illuminating kerosines are petroleum products used primarily for illumination and household needs. Illuminating kerosines are burned in ordinary lamps, in so-called incandescent kerosine stoves, in kerosine gas burners, and in Primus stoves.

Illuminating kerosine and pironaft are also used for technological purposes, such as solvents in the production of oil-cloths, for soaking hides, and the like.

2. Index to Technical Standards for Illuminating Kerosines and Naphtha Solvents.

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Illuminating Kerosine	GOST 4753-49	Illuminating Kerosine	
Illuminating Kerosine	GOST 92-50	Pironaft	High-ignition-temperature kerosine designed for use in lamps in rooms with high temperatures (boiler rooms, etc.), on small ships that do not have electrical illumination, for signal lamps, beacons, lighthouses, etc.
Gasoline Solvent	GOST 443-50	Rubber Solvent	For making adhesives in the rubber industry.
Extraction Gasoline	GOST 462-51	Extraction Gasoline	For extracting oils from seeds and oil cakes; for recovering nicotine and fat from bones.
Gasoline Solvent	GOST 3134-52	Turpentine Substitute	For making lacquers and paints in the paint industry.

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USSR Technical Standards for Illuminating Kerosines - 1952

Specification	GOST 4753-49 Illuminating Kerosine	GOST 92-50 Pironaft a/ b/
Density (d_{20}^4) (max)	0.840	0.861
Color (Stammer), mm (max)	3.0	3.0
Smoke Point, mm (Height of Flame) (min)	20	
Flash Point, OC (Pensky-Martens-closed cup) (min)	40 (104) b/	90 (194) b/
Cloud Point, OC (max)	-12 (10) b/	
Acidity, mg KOH/100 ml oil (max)	1.4	
Ash Content, % (max)	0.005	
Distillation, OC		
(a) % off @ 270°C (518) b/ (min)	70	None
(b) % off @ 315°C (599) b/ (min)	98	None
Sulfur, wt % (max)	0.1	None
Water-Soluble Acids and Alkalies		
Mechanical Impurities		
Water		

a. High-ignition-temperature kerosine.
b. Temperature in °F.

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USSR Technical Standards for Gasoline Solvents and Extraction Gasolines - 1952

Specification	GOST 443-50	GOST 462-51	GOST 3134-52
	Rubber Solvent	Extraction Gasoline	Turpentine Substitute for Lacquer Industry
Density, (d 20) (max)	0.730	0.725	0.795
Distillation, °C			
IBP (min)	80 (176) a/	70 (158) a/	Not over 165 (329) a/
% off @ 95°C (203) a/ (max)	93		
% off @ 110°C (230) a/ (max)	98		
% off @ 120°C (248) a/ (max)			
% off @ 200°C (392) a/ (max)			
Residue, % (max)	1.5	1.0	98
Test for Formation of Oil Stain	Passes	4.0	2.0 (including loss)
Aromatics, % (max)	3.0		
Iodine Number, g/100g (max)	0.10		
Mechanical Impurities and Water	-----	None	-----
Water-Soluble Acids and Alkalies	-----	None	-----
Flash Point, °C (Pensky-Martens-closed cup)			
(min)			33 (91) a/
Rate of Vaporization Compared with Xylene			From 3.0 to 4.5
Sulfur, wt. % (max)		0.05	0.025

a. Temperature in °F.

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E. Tractor Fuels.

1. Explanatory Notes.

Ligroin and kerosine fractions of straight-run distillation and mixtures of these with thermally cracked fractions, with a boiling range of 110° to 300°C, are used as fuel for tractor piston engines. Due to the absence of light ends in the ligroin and kerosine, it is possible to use them only after preheating. For this purpose tractor engines are equipped with installations which preheat the fuel-air mixture with exhaust gas.

Tractor engines are started with gasoline, and after starting and warming up, the engine is switched to ligroin or kerosine.

2. Index to Technical Standards for Tractor Fuel.

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Tractor Fuel	GOST 2109-46	Ligroin	Used in heavy-duty carburetor caterpillar tractor, Type ChTZ.
Tractor Fuel	GOST 1842-52	Tractor Kerosine	Used in tractor engines, type STZ, SKhTZ-NAMI.
	"	Tractor Kerosine (High Octane)	

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USSR Technical Standards for Tractor Fuel - 1952

(Carburetor)

Specification	GOST 2109-46		GOST 1842-52	
	Ligroin		Tractor Kerosine	Tractor Kerosine (High Octane)
Octane Number (min)	54		40	45
Distillation, °C				
10% (min)			110 (230) a/	110
10% (max)			180 (356) a/	
12% (max)				
50% (max)			190 (374) a/	190
90% (min)			240 (464) a/	240
90% (max)			275 (527) a/	
98% (max)			300 (572) a/	290 (554) a/
Acidity, mg KOH/100 ml (max)	4		4.5	4.5
Ash Content, wt % (max)			0.005	0.005
Gum, mg/100 ml (max)			40	40
Sulfur, wt % (max)			1.0	1.0
Copper Strip Corrosion Test			Must Pass	
Water-Soluble Acids and Alkalies			None	
Mechanical Impurities			None	
Water		None	Trace	Trace

a. Temperature in °F.

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F. Diesel Fuels.

1. Explanatory Notes.

There are 2 types of diesel fuels produced in the USSR: high-speed diesel fuels for use in diesel engines operating over 1,000 rpm, and low-speed diesel fuel for diesel and semi-diesel engines operating under 1,000 rpm.

a. High-Speed Diesel Fuel.

For high-speed transport (automobile, tractor) and stationary diesels of the types YaAZ-204, D-35 (KD-35), D-54 (DT-54), KDM-46 (S-80), V-2, D-6, etc. and similar imported diesels, fuels must be used according to GOST 305-42 and 4749-49.

All types of high-speed diesel fuel are interchangeable provided the temperature conditions make this possible. For high-speed diesels the most satisfactory fuel has a boiling range between 200° and 370°C (392°-698 F).

b. Low-Speed Diesel Fuel.

Solar oil, a product of straight-run distillation and acid treating, is used for engines of medium speed (500 to 1,000 rpm), for tractors of the ChTZ-S-65 and ChTZ-S-80 types, and for stationary and marine engines.

Low-speed diesel engines which operate at up to 500 rpm and semi-diesel engines of any given design operate on heavy engine fuels, DT-1 (M3), DT-2 (M4), and DT-3 (M5). These fuels are heavy residual products of straight-run distillation of crude oil.

2. Index to Technical Standards for Diesel Fuels.

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
High-Speed Diesel Fuel	GOST 4749-49	Arctic Fuel-DA	For especially cold zones and seasons of the year in regions where the air temperature is below -30°C.

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<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
	"	Winter Fuel-DZ	For regions where the temperature is higher than -30°C.
	"	Summer Fuel-DL	Intended for use in a temperature of above 0°C.
	"	Special Fuel-DS	
	GOST 305-42	Summer Fuel-L	
	"	Winter Fuel-Z	
Low-Speed Diesel Fuel	GOST 1667-51	DT-1 (M ₃)	
	"	DT-2 (M ₄)	
	"	DT-3 (M ₅)	
	GOST 1666-51	Solar Oil	

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USSR Technical Standards for Diesel Fuels - 1952

Specification	GOST 4749-49				GOST 305-42	
	Arctic fuel DA	Winter fuel DZ	Summer fuel DL	Special fuel DS	Summer fuel L	Winter fuel Z
Cetane Number (min)	40	40	45	50		
Distillation, °C						
10% (min)	200 (392) a/*	200				
50% (max)	255 (491) a/	275 (527) a/	290 (554) a/	280 (536) a/		
90% (max)	300 (572) a/	335 (635) a/	350 (662) a/			
96% (max)	330 (626) a/			340 (664) a/		
% at 300 (572) a/ (min)					50	50
% at 350 (662) a/ (min)					85	85
Viscosity @ 20°C (68) a/						
Centistokes	2.5-4.0	3.5-6.0	3.5-8.0			
OEngler	1.15-1.3	1.25-1.45	1.25-1.7			
Saybolt, Universal	35-40	38-47	38-53			
Viscosity @ 50°C (122) a/						
Centistokes						
OEngler						
Saybolt, Universal						
Carbon Residue, % (max)	0.05					
						0.1

* Footnote follows on page 23.

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USSR Technical Standards for Diesel Fuels - 1952

Fuel for Low-Speed Diesel and Semi-Diesel Engines

Specification	GOST 1667-51			GOST 1666-51	
	DT-1 (M ₃)	DT-2 (M ₄)	DT-3 (M ₅)	Solar Oil	
Viscosity @ 50°C (122) a/ (max)					
Centistokes	36.0	55.3	66.6		5.0-9.0
Engler	5.0	7.5	9.0		1.39-1.76
Saybolt, Universal	167	264	314		42-56
Distillation					
% off at 250°C (482) a/ (max)	15	15	15		
Carbon Residue, % (max)	3.0	3.5	4.0		
Ash Content, % (max)	0.04	0.08	0.08		0.025
Sulfur, wt % (max)	0.5	0.5	0.5		0.2
Hydrogen Sulfide Content		None			
Water-Soluble Acids and Alkalies			None		
Mechanical Impurities, % (max)	0.1	0.1	0.1		None
Water, % (max)	1.0	1.0	1.0		Trace
Flash Point, °C (open cup) (min)					125 (257) a/
Flash Point, °C (Pensky-Martens-closed cup) (min)	65 (149) a/				
Freezing Point, °C (max)	-5 (23) a/	65	65		
		-5	+5 (41) a/		-20 (-4) a/

a. Temperature in °F.

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CONFIDENTIALG. Boiler Fuels.1. Explanatory Notes.

Liquid boiler fuel is the heavy product of processing petroleum, coals, and combustible shales. Also included in the liquid boiler fuel group is the crude oil that is not presently used for refining. Liquid boiler fuels, being high-quality-type fuels, are extensively used for steam boilers (both stationary and mobile) and for various industrial furnaces.

Included in the liquid boiler fuel group are the combustible petroleum mazuts which are the residues from petroleum refining. The following are included in the types of boiler fuels:

a. Marine (fleet) mazut - designed for firing special ship boiler installations.

b. Mazut fuels - classified by viscosity into grades 20, 40, 60, 80, 100. Used as a fuel for steam boilers (mobile and stationary) of the ordinary type, for igniting large steam boilers operating on coal dust, and also used either independently or in a mixture with other types of fuel in various industrial furnaces (open-hearth, rolling mill, etc.)

2. Index to Technical Standards for Boiler Fuels.

Name	Specification	Grade	Remarks
Boiler Fuel (Mazut)	GOST 1626-44	Fleet Mazut 12	
	"	Fleet Mazut 20	Used only on the seas in southern districts.
	TU	Ukhta Boiler Fuel	Used in boiler installations and heating furnaces equipped with facilities for heating Mazut
	TU	Heavy Yaregskaya Crude	Used as a fuel for steam boilers, including ship boilers.
Mazut Fuels	GOST 1501-52	20	
	"	40	
	"	60	
	"	80	
	"	100	

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USSR Technical Standards for Boiler Fuels - 1952

Mazut Fuels

GOST 1626-44

Specification	Mazut Fuels			Heavy Yaregskaya Petroleum TU
	Fleet Mazut 12	Fleet Mazut 20	Ukhta Boiler Fuel TU	
Viscosity, °Engler				
@ 50°C (max)	12	6	30	28
@ 75°C (max)			13	
@ 100°C (max)			110 (230) a/	
Flash Point, °C (Brenken-open cup) (min)	90 (194) a/	90		94 (201) a/
Flash Point, °C (Pensky-Martens) (min)	-8 (18) a/	-5 (23) a/	+25 (77) a/	-11 (12) a/
Freezing Point, °C (max)	0.15	0.15	0.5	0.15
Ash Content, % (max)	0.8	0.8	1.4	1.3
Sulfur, wt % (max)	1.0	1.0	2.0	2.0
Water, % (max)	0.5	0.5		0.5
Mechanical Impurities, % (max)	50	60		75
Tar Content, % (max)				
Distillation, °C				
IBP (min)				
10%				195 (383) a/
40%				285 (545) a/
Water-Soluble Acids and Alkalies				345 (653) a/
			None	

a. Temperature in °F.

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USSR Technical Standards for Boiler Fuels - 1952

Specification	Mazut Fuels			
	GOST 1501-52			
	20	40	60	80
Viscosity @ 80°C (176) a/				
Engler	2.5-5.0	5.0-8.0	8.0-11.0	11.0-13.0
Ash Content, % (max)	0.30	0.30	0.30	0.30
Sulfur Content, %				
Low-Sulfur Fuel (max)	0.50	0.50	0.50	0.50
Sulfurous Fuel (max)	1.0	1.0	1.0	1.0
High-Sulfur Fuel (max)	3.5	3.5	3.5	3.5
Water-Soluble Acids and Alkalies			None	
Mechanical Impurities, % (max)				
Water, % (max)	2.0	2.0	2.0	2.5
Freezing Point, °C (max)	+ 5 (41) a/	+ 10 (50) a/	+ 15 (59) a/	+ 20 (68) a/
Density, (d 20) (max)				0.990
Flash Point, °C (Brenken-open cup) (min)	80 (176) a/	100 (212) a/	110 (230) a/	120 (248) a/
Calorific value, Cal/g				
Low-Sulfur Fuel	9,870	9,750	9,700	9,670
Sulfurous Fuel	9,870	9,750	9,700	9,670
High-Sulfur Fuel	9,680	9,610	9,560	9,530

a. Temperature in °F.

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H. Lubricating Oils.

1. Industrial.

a. Explanatory Notes.

In the group of industrial oils are included oils used for lubricating very diverse production and power machines and machinery that operates primarily at normal temperatures in the surrounding medium without coming into direct contact with steam, hot air, or gases. Certain oils of this group are also used for the technological needs of different branches of industry.

Despite the fact that at the present time there are 22 grades of oil in the industrial group, this assortment no longer completely satisfies all the requirements made on it by industry; therefore, the group of industrial oils used in a number of cases is expanded with auto and tractor oils, turbine oils, and others.

Industrial oils as lubricants for one purpose or another must be chosen with consideration for the basic conditions under which the oil must operate in the mechanism: specific load, speed of motion, temperature of the medium, methods of supplying the oil to the friction surfaces, type of metal, etc. The types of industrial oils are:

(1) Light industrial oils.

(a) These oils are used primarily for lubricating light mechanisms that operate at high rotating speeds.

(2) Medium industrial oils.

(3) Heavy industrial oils.

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b. Index to Technical Standards for Light Industrial Lubricating Oils (Visc E50 = 1.3-1.8)

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Velosite	GOST 1840-51	L oil for high-speed mechanisms	Used in textile industry for lubricating spinning and twining machines; in the metal-working industry for spindles of machine tools that operate at more than 8,000 rpm; for low-power electric motors with more than 8,000 rpm; for control and measuring instruments.
Vaseline Oil	GOST 1840-51	T oil for high-speed mechanisms	Used in textile industry for lubricating light knitting machines; in the metal-working industry for machine tools operating at more than 5,000 rpm; for electrical motors operating at more than 5,000 rpm; for control and measuring instruments.
Solar Oil	GOST 1666-51		Also used for technological purposes: for saturating sugar liquor in sugar refining industry; for greasing hides in the leather industry; for making creams in the perfume industry.
Sewing Machine Oil	GOST 973-50		Used for lubricating mechanisms that operate at low loads and high speeds; also used as a fuel for diesels; also used for technological purposes: saturating sugar liquor, soaking hides, etc.
Separator Oil	GOST 176-50	L	Used for lubricating sewing, knitting, and hosiery machines. Used chiefly for lubricating light separators.

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b. Index to Technical Standards for Light Industrial Lubricating Oils (Visc E50 - 1.3-1.8) (continued)

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Instrument Oil	GOST 1805-51	MVP Vaseline Oil	Designed for lubricating special equipment operating at very low temperatures.
Instrument Oil	TU 327-50		Used for lubricating control and measuring instruments that operate at very low temperatures; for filling pneumatic oil shock absorbers; for making low-freezing lubricants.

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USSR Technical Standards for Light Industrial Oils - 1952

Oil for High Speed Mechanisms

Specification	GOST 1840-51	GOST 1666-51	GOST 973-50	GOST 176-50	TU-327-50	GOST 1805-51
	L (Vaseline)	Solar Oil	Sewing Machine Oil	L Separator Oil	TsIATIM-IM	Instrument Oil MVP
Viscosity @ 50°C (122) a/						
Centistokes	4.0-5.1	5.0-9.0	6.0-10.0	6.0-10.0	Over 6.3	6.3-8.5
Engler	1.29-1.40	1.39-1.76	1.48-1.86	1.48-1.86		1.51-1.72
Saybolt, Universal	40-43	43-56	46-59	46-59		46-55
Kinematic Viscosity @ -40°C						
(Centistokes)						
Flash Point, °C (Brenken-open cup) (min)						
Flash Point, °C (Pensky-Martens-closed cup) (min)						
Freezing Point °C (max)	112 (234) a/	125 (257) a/	135 (275) a/	+5 (41) a/	-60 (-76) a/	120 (248) a/
Acid Number, mg/KOH/gm of oil (max)	-25 (-13) a/	-20				-60
ash Content, % (max)	0.04	0.025	0.1	0.35	0.025	0.14
Sulfur, wt % (max)	0.005	0.2	0.01		0.005	0.005
Mechanical Impurities						
Water	None	Trace	None	None		
Water-Soluble Acids and Alkalies						
density (d 20) (max)					0.883	
Color, mm (Dubosque method)						
Distillation, °C						
IBP						270 (518) a/
FBP						340 (644) a/

a. Temperature in °F.

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c. Index to Technical Standards for Medium Industrial Lubricating Oils (Visc E₅₀ = 1.8-8.0)

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Industrial Oil 12	GOST 1707-51	Spindle Oil 2	Used chiefly for lubricating the spindles of weft and rewind machines; for spindles of grinding machines that operate at 1,500-5,000 rpm; for bearings of low-power electric motors with ring lubrication systems; for the hydraulic systems of light mechanisms.
Industrial Oil 20	"	Spindle Oil 3	Used for lubricating metal-working machine tools, textile machines, medium-power electric motors with a ring system of lubrication, and also as the functional-fluid in the hydraulic systems of metal-working machine tools and other medium-power mechanisms.
Industrial Oil 30	"	L Machine Oil	Used in the metal-working industry, light industry, metallurgical industry, paper industry, etc. Also used in the hydraulic systems of medium-power mechanisms.
Industrial Oil 45	"	S Machine Oil	Used as extensively as Industrial Oil 30, but for mechanisms that operate under heavier loads.
Industrial Oil 50	"	SU Machine Oil	Used for lubricating critical and relatively heavy mechanisms operating under heavy loads and at low speeds (under 1 meter second) with frequent stops. Can also be used for lubricating various engines, including low-power stationary diesels, either alone or as a component.

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c. Index to Technical Standards for Medium Industrial Lubricating Oils (Visc E50 = 1.8-8.0). (continued)

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Industrial Oil 20V a/	GOST 2854-51	Spindle Oil 3V a/	Can be used for lubricating mechanisms that have a hand (pouring) system of lubrication. Not recommended for use in circulating systems.
Industrial Oil 45V a/	GOST 2854-51	SV Machine Oil a/	Used mostly for mechanisms with a flowing system of lubrication.
Separator Oil	GOST 176-50	T	Used for lubricating the bearings of heavy separators and of mechanisms that operate under medium or low loads at high speeds. Industrial oils 20 or 30 can be used as a substitute.
Telegraph Oil	ST 2-4642	L	Used for lubricating telegraph apparatus.
Oil for the Tilting Mech- anisms of Dump Trucks	GOST 5660-51		Used for the hydraulic lift and dump mechanisms of transport vehicles and other machines.

a. V refers to caustic-treated oils (Leached Oils).

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USSR Technical Standards for Medium Industrial Oils - 1952

Industrial Oils
GOST 1707-52

	12	20	30	45	50
Specification	(Spindle Oil 2)	(Spindle Oil 3)	(L Machine Oil)	(S Machine Oil)	(SU Machine Oil)
Viscosity @ 50°C (122) a/					
Centistokes	10-14	17-23	27-33	38-52	42-58
Engler	1.86-2.26	2.60-3.31	3.81-4.59	5.24-7.07	5.76-7.86
Saybolt, Universal	59-74	86-111	128-155	177-241	195-268
Carbon Residue, % (max)			0.3	0.3	0.2
Acid Number, mg KOH/gm of oil (max)	0.14	0.14	0.2	0.35	0.15
Ash Content, % (max)	0.007	0.007	0.007	0.007	0.005
Water-Soluble Acids and Alkalies					
Mechanical Impurities, % (max)	None	None	None	None	None
Water (max)	None	None	0.007	0.007	0.007
Flash Point, °C (Brenken-open cup)					
(min)	165 (329) a/*	170 (338) a/	180 (356) a/	190 (374) a/	200 (392) a/
Freezing Point °C (max)	-30 (-22) a/	-20 (-4) a/	-15 (5) a/	-10 (14) a/	-20
Density, (d 20) (range)					
($\frac{4}{4}$)					
Color, mm (Dubosque) (min)					

* Footnote follows on page 35.

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USSR Technical Standards for Medium Industrial Oils - 1952 (continued)

Leached Industrial Oils		GOST 2854-51		GOST 176-50		St. 2-4642		GOST 5660-51	
		20 V	45 V	T	L				
		(Spindle Oil 3V)	(SV Machine Oil)	Separator Oil	Telegraph Oil				
Viscosity @ 50°C (122) a/		17-23	38-52	14.0-17.0					
Centistokes		2.60-3.31	5.24-7.07	2.26-2.6	1.8-2.0			18.5-20.5	
Engler		86-111	177-241	74-86				2.78-3.0	
Saybolt, Universal								91-100	
Carbon Residue, % (max)									
Acid Number, mg KOH/gm of oil (max)		0.14	0.35	0.35	0.2				
Ash Content, % (max)									
Water-Soluble Acids and Alkalies									
Mechanical Impurities, % (max)									
Water (max)			0.007						
Flash Point, °C (Brenken-open cup)									
(min)									
Freezing Point °C (max)		170 (338) a/	180 (356) a/	165 (329) a/	137 (279) a/			135 (275) a/	
Density, (d 20) (range)		-15 (5) a/	-8 (18) a/	+5 (41) a/					
(4)								0.868-0.870	
Color, mm (Dubosque) (min)									
								20	

Temperature in °F.

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CONFIDENTIALd. Index to Technical Standards for Heavy Industrial Lubricating Oils.

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Bright Stock	TU 233-47		Used in the metallurgical industry (in circulating systems of rolling equipment); in the electrical insulation industry for making cable compounds; as a compressor oil for air compressors with a high degree of compression.
Cylinder Oil II	GOST 1841-51		Used generally where a high-viscosity oil that has been extensively acid-treated is required.
			Used for worm and cylindrical gear transmissions and for mechanisms operating at high temperatures.
			Can also be used for lubricating cylinders of certain types of air compressors.
Oil for Presses	GOST 5519-50		Designed for use in the feed system of presses. (Produced by mixing aviation oil MS-20 and industrial oil 50)
Gargoyle Oil	TU 343-50		Used for lubricating mechanisms that operate under relatively high loads. (Mixture of MS aviation oil and industrial oil 45)

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USSR Technical Standards for Heavy Industrial Oils - 1952

	<u>TU 233-47</u>	<u>GOST 1841-51</u>	<u>GOST 5519-50</u>	<u>TU 343-50</u>
	Bright Stock	Cylinder Oil II	Oil for Presses	Gargoyle Oil
<u>Specification</u>				
Viscosity @ 100°C (212) a/		9 -13	Greater than 10.0	
Centistokes	3.7	1.76-2.15	Greater than 1.86	2.6
Engler		56-71	Over 58	
Saybolt, Universal	0.906			0.904
Density (d 20) (max)				
($\frac{4}{4}$)				
Carbon Residue, % (max)	1.0	0.8		
Acid Number, mg KOH/gm of oil (max)		0.3		
Ash Content, % (max)		0.03		
Water-Soluble Acids and Alkalies				
Mechanical Impurities, % (max)				
Water				
Flash Point, °C (Brenken-open cup) (min)	275 (527) a/	215 (419) a/	200 (392) a/	228 (442) a/
Freezing Point, °C	-10 (14) a/	+5 (41) a/	-15 (5) a/	-10
Color, (NPA number) (max)	8			

a. Temperature in °F.

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2. Aviation.

a. Explanatory Notes.

Lubricating oils are used in aviation engines under conditions of heavy loads and high temperatures. As aviation engines have developed, the thermal stresses in them have continually increased, the number of rpms has increased, the loads have become heavier; this has led to further difficulties in the functional conditions for the oil in the engine. In this connection, constantly growing demands are being made on the quality of lubricating oils for modern aviation engines, and to meet these demands it has become necessary to produce aviation oils from specially selected high-quality raw material and subjecting the oil to thorough refining.

As a rule, aviation oils are produced as the result of experimental developments in state laboratories. These oils are required to pass standards for use in aviation engines.

The raw materials for producing the assortment of aviation oils are a number of selected crudes (Baku and Emba). The crudes are distilled in vacuum stills and the selected bottoms cuts are acid-treated and/or solvent-extracted.

(1) Sulfuric acid treating - oils are treated to remove asphalt, aromatic, and unsaturated hydrocarbons; the acid oil is treated with clay for neutralization and supplementary removal of compounds mentioned.

(2) Solvent extraction - Selective solvents, such as propane, phenol, cresol, or nitrobenzene, are used to remove undesirable compounds mentioned above. A better product is obtained in most cases than upon acid treating.

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b. Index to Technical Standards for Aviation Lubricating Oils.

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Aviation Lube Oil	GOST 1013-49	MS-14	MS oils should be used primarily in the more powerful aircraft engines where operating temperatures are more severe.
"	"	MS-20	
"	"	MK-22	
"	"	MS-24	

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USSR Technical Standards for Aviation Lubricating Oils - 1952

Specification	GOST 1013-49			
	MS-14	MS-20	MK-22	MS-24
Viscosity @ 100°C (212) a/ Centistokes	14	20	22	24
Engler	2.2	2.87	3.1	3.34
Saybolt, Universal	74	98	107	115
Ratio of Viscosity @ 50°C to Viscosity @ 100°C (max)	6.55	7.85	8.75	8.0
Carbon Residue, % (max)	0.45	0.3	0.7	0.3
Acid Number, mg KOH/gm of oil (max)	0.25	0.05	0.1	0.05
Ash Content, % (max)	0.003	0.003	0.004	0.003
Flash Point, °C (Pensky-Martens-closed cup) (min)	200 (392) a/	225 (437) a/	230 (446) a/	240 (464) a/
Temperature Difference in °C between open and closed cup Flash Points (max)	20 (68) a/	20	20	20
Freezing Point, °C (min)	-30 (-22) a/	-18 (0) a/	-14 (7) a/	-17 (1) a/
Color, mm (Dubosque Method) 15 parts of oil in 85 parts of Ligroin (min)	16	NPA 7	15	NPA 7
Density (d 20) (min)	0.890	0.895	0.905	0.990
Oxidation Stability @ 250°C (482), a/ minutes (min) Papok method	20	17	35	20
Corrosion, g/m ² Pinkevich test (max)	60	45	2.0	45
Viscosity Coefficient (max)	70	55	76	65
Mechanical Impurities	---	---	---	---
Water	---	---	None	---
Water-Soluble Acids and Alkalies	---	---	None	---
Selective Solvents	---	---	None	---
Temperature in °F.	---	---	---	---

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3. Auto, Tractor, and Diesel.

a. Explanatory Notes.

Auto and tractor oils are classified according to method of production as distillate oils and compound oils, i.e. those that are produced by mixing high-viscosity residual oils with distillate oils. As to method of refining, they are classified as acid-treated oils and solvent-extracted oils.

In relation to the type of auto or tractor engine, its technical characteristics, and the condition of use, auto and tractor oils are divided into oils for carburetor engines and oils for diesel engines. Within each of these groups the oils are classified into types and grades by the method of refining, by the conditions of use (summer, winter), into oils with additives and oils without additives.

(1) Oils for Carburetor Engines. For lubricating automobile, tractor, and motorcycle engines with spark ignition, distillate oils--avtols of different grades--are used.

(2) Oils for Diesel Engines.

(a) High Speed. Operating experience with high-speed auto, tractor, and marine diesels has shown that even the very highest quality oils do not ensure normal operation of the engines without additives; therefore, only oils with special additives should be used for diesels of this type.

(b) Low Speed. For lower speed diesels of the M-17 type, and for all kinds of stationary oil, kerosine, and gas engines with low or medium speeds, it is possible to use such oils as diesel oil without additives, motor oils and, in certain cases, auto and tractor oils of the appropriate viscosity.

CONFIDENTIALb. Index to Technical Standards for Auto and Tractor Lubricating Oil.

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Alid-Treated Auto-Tractor Oil	GOST 1862-51	AKZ _p -6	Used for lubricating automobile carburetor engines under winter conditions in northern districts. (Thickened with polyisobutylene + TsiATIM-331 or AZN1-4 added)
"	"	AK-6 (Avtol 6)	Used for lubricating automobile carburetor engines in winter
"	"	AKZ _p -10	Used as a universal automobile oil, i.e., summer and winter.
"	"	AK-10 (Avtol 10)	Used for lubricating automobile carburetor engines in summer and tractor carburetor engines in fall and winter.
"	"	AK-15 (Avtol 18)	Used for tractor carburetor engines in summer.
Solvent-Extracted Auto-Tractor Oil	GOST 5239-51	AS-5	Used for all carburetor engines in spring, fall, and winter (at temperatures of -15°C); in summer it is used for new engines.
"	"	AS-9.5	Used as a component in making AS-5 oil, which is made by compounding AS-9.5 oil and industrial oil 12.
			Both AS-5 and AS-9.5 oils are used as base oils for producing automobile oils with additives.

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USSR Technical Standards for Auto and Tractor Lubricating Oils - 1952

Auto-Tractor Oils - Sulfuric Acid-Treated

Auto-Tractor Oils - Solvent-Refined

Specification	GOST 1862-51			GOST 5239-51		
	AKZ-6	AK-6	AKZ-10	AK-10	AK-15	AS-5 AS-9.5
Viscosity @ 0°C (32) a/ (max)	550		1,100		1,500	
Centistokes	6	6	10	10	15	6
Viscosity @ 100°C (212) a/ (max)	1.48	1.48	1.83	1.83	2.32	1.48
Centistokes (Cs)	46	46	59	59	78	46
Engler	4.2	7.0	4.5	7.0	9.0	7
Ratio of Cs @ 50°C to 100°C (max)	0.15	0.30	0.15	0.40	0.70	0.15
Carbon Residue, % (max)	0.10	0.15	0.10	0.25	0.35	0.2
Acid Number, mg KOH/gm of oil (max)	2.80	0.01	2.80	0.02	0.025	0.015
Acid Number with TsIATIM-331 additive, mg KOH/gm (max)	0.01	0.01	0.01			
Ash Content, % (max)	0.04		0.04			
Ash Content, %, with Azni-4 additive (min)	0.4		0.4			
Flash Point, °C (Brenken-open cup)	170 (338) a/ -40 (-40) a/	185 (365) a/ -30 (-22) a/	170 -40	200 (392) a/ -25 (-13) a/	215 (419) a/ -5 (23) a/	180 (356) a/ -35 (-31) a/
Freezing Point, °C (min)						210 (410) a/ -20 (-4) a/
Oxidation Stability @ 250°C, minutes (min)				20		20
Water-Soluble Acids and Alkalies				None		
Mechanical Impurities				None		
Mechanical Impurities with additives, % (max)	0.01		0.01			
Water (max)				Trace		
Water, mm (min)	6		6	3.5		4.0
Color, mm						
Sulfur Content						None

a. Temperature in °F.

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c. Index to Technical Standards for Automobile Lubricating Oil (Additive).

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Special Automobile Oil with TsIATIM-330 Additive (NAKS)	GOST 3829-51	Summer	Consists of industrial oil 50 with 3 percent of NAKS (TsIATIM-330) added. Both grades are used for high-compression engines in ZIS-110 and similar types of automobiles
	"	Winter	Consists of a mixture of industrial oil 50 (70%) with AU spindle oil (30%) with 3 percent of NAKS (TsIATIM-330)
Automobile Oils ..with TsIATIM-331 Additive	GOST 5303-50	AS -5 p	All are general-purpose oils for all types of carburetor automobiles, including those that have engines with a high-compression ratio (GAZ-51, ZIS-150, Pobeda, etc.).
	"	AK -5 p	
	"	AS -9.5 p	They are standard automobile oils, either acid-treated or solvent-extracted, with 3 percent TsIATIM (complex additive) added.
	"	AK -9.5 p	

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USSR Technical Standards for Automobile Lubricating Oil (with Additives) - 1952

Special Automobile Oils with
TsiATIM-330 Additive (NAKS)

Automobile Oils with TsiATIM-331 Additive

Specification	GOST 3829-51		GOST 5303-50		
	Summer	Winter	AS _p -5	AK _p -5	AS _p -9.5 AK _p -9.5
Viscosity @ 50°C (122) a/ *					
Centistokes, (C _s)	45-60	29-33			
OEngler	6-8	4-4.5			
Saybolt, Universal	209-278	137-155			
Viscosity @ 100°C (212) a/					
Centistokes, (C _s)			5	5	9.5
OEngler			1.39	1.39	1.78
Saybolt, Universal			43	43	58
Flash Point, (Brenken-open cup) °C (min)	200 (392) a/	165 (329) a/	170 (338) a/	185 (365) a/	200
Freezing Point, °C (max)	-20 (-4) a/	-25 (-13) a/	-30 (-22) a/	-30	-20
Acid Number, mg KOH/gram of oil (max)	2	2	3.0	3.0	3.0
Carbon Residue %, (max)	0.8	0.8	0.4	0.4	0.4
Ash, %, (max)	0.2	0.2	0.025	0.025	0.025
Mechanical Impurities, %, (max)	0.0085	0.0085			

* Footnote follows on page 46.

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USSR Technical Standards for Automobile Lubricating Oil (with Additives) - 1952 (continued)

Special Automobile Oils with
TsiATIM-330 Additive (NAKS) Automobile Oils with TsiATIM-331 Additive

Specification	GOST 3829-51		GOST 5303-50		
	Summer	Winter	AS _p -5	AS _p -9.5	AK _p -9.5
Water, %, (max)	---	---	---	---	---
Water-Soluble Acids	---	---	---	---	---
Ratio of Cs at 50°C to Cs at 100°C (max)	---	---	---	---	---
Oxidation Stability @ 250°C (482), a/ minutes (min)	---	---	---	---	---
Papok method	---	---	---	---	---
Corrosion, g/m ² Pinkevich test (max)	30	30	7	7.4	8.8
Water-Soluble Alkalies	5	5	---	---	---
Sulfur Content	---	---	---	---	---

Temperature in °F.

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d. Index to Technical Standards for High-Speed Diesel Lubricating Oils.

Name	Specification	Grade	Remarks
Diesel Oil	GOST 1600-46		Usually made by compounding MK-22 aviation oil with a highly refined low-viscosity oil; used for high-speed tractor and stationary diesels with babbit bearings..
Diesel Oil - EMBA	TU 322-50		
Diesel Oil	VTU-730-51	37D (base)	Made by compounding MK-22 aviation oil with AU spindle oil; is used with AZNi-TsIATM-1 additive, which is added by the consumer.
Tractor Diesel Oil (with AZNi-4 Additive)	VTU 363-51	Base	Acid-treated distillate oil from Baku crudes.
	"	With Additive (3% AZNi-4)	Both grades are used temporarily in DT-54 and 5-80 tractor diesels as a substitute for oils according to GOST 5304-50 and GOST 1600-46.
Diesel Oil with AZNi-4 Additive	GOST 5304-50	Z (Winter)	Consists of industrial oil 50+3% AZNi-4.

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d. Index to Technical Standards for High-Speed Diesel Lubricating Oils. (continued)

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Diesel Oil with AZNi-4 Additive (continued)	GOST 5304-50	L (Summer)	Consists of a mixture of MK-22 aviation oil with AU spindle oil + 3% AZNi-4 added. Both Z and L grades are used in diesels YaAZ-204, KD-35, DT-54, and others that have bearing inserts of alloys which are readily corrosive.

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USSR Technical Standards for Diesel Lubricating Oil (High Speed) - 1952

	Diesel Oil GOST 1600-46	Diesel Oil Emba TU 332-50	Diesel Oil Emba TU 256-49 Solvent-Refined	Diesel Oil 37D VTU 370-51 (base)
Viscosity @ 50°C (122) a/*				
Centistokes, (C _s)	77			77
Engler	10.4			10.4
Saybolt, Universal	360			360
Viscosity @ 100°C (212) a/				
Centistokes, (C _s)	10.5	14.4	14.4	10.5
Engler	1.9	2.3	2.3	1.9
Saybolt, Universal	61	75	75	61
Ratio of C _s @ 50°C to C _s @ 100°C (max)		7.2	7.2	
Specific Gravity, (d 20) ($\frac{4}{15}$)		0.896	0.895	
Flash Point, (Brenken-open cup) °C, (min)	210 (410) a/	210	210	190 (374) a/
Freezing Point, °C (max)	-10 (14) a/	0 (32) a/	-5 (23) a/	-10
Acid Number, mg KOH/gram of oil (max)	0.15	0.35	0.25	0.15
Carbon Residue, % (max)	0.4	0.8	0.5	0.4
Ash Content, % (max)	0.005	0.004	0.004	0.005
Mechanical Impurities, % (max)	-----	-----	-----	-----
Water, % (max)	-----	-----	-----	-----
Water-Soluble Acids and Alkalies	-----	-----	-----	-----
Oxidation Stability @ 250°C (482), a/ minutes (min) Papok method	-----	-----	-----	-----
Corrosion, g/m ² Pinkevich test (max)	-----	-----	-----	-----
Color, mm (min)	-----	-----	-----	-----

Footnote follows on page 50.

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USSR Technical Standards for Diesel Lubricating Oil (High Speed) - 1952 (continued)

Specification	Tractor Diesel with AZNi-4 Additive VTU 363-51		Diesel Oil with AZNi-4 Additive GOST 5304-50	
	Base	With Additive	Z	L
Viscosity @ 50°C (122) a/				
Centistokes, (C _s)			55	74
Engler			7.3	9.8
Saybolt, Universal			255	342
Viscosity @ 100°C (212) a/				
Centistokes, (C _s)	10.0	10.0	8.3	10.4
Engler	1.8	1.8	1.68	1.86
Saybolt, Universal	59	59	53	60
Ratio of C _s @ 50°C to C _s @ 100°C (max)	7.0	7.0		
Specific Gravity, (d 20) ($\frac{4}{4}$)	0.921			
Flash Point, (Brenken-open cup) °C, (min)	200 (392) a/	200	200	190 (374) a/
Freezing Point, °C (max)	-10	-10	-20 (-4) a/	-15 (5) a/
Acid Number, mg KOH/gram of oil (max)	0.15	0.15	0.15	0.15
Carbon Residue, % (max)	0.35	0.5		
Ash Content, % (max)	0.007 (max)	0.035 (min)	0.035 (min)	0.035 (min)
Mechanical Impurities, % (max)		0.01	0.01	0.01
Water, % (max)	Traces			
Water-Soluble Acids and Alkalies				
Oxidation Stability @ 250°C (482), a/ minutes (min) Papok method				
Corrosion, g/m ² Pinkevich test (max)				
Color, mm (min)	10	5	25	25
	4.0		5	5
Temperature in °F.				

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e. Index to Technical Standards for Low-Speed Diesel Lubricating Oil.

<u>Name</u>	<u>Specification</u>	<u>Grade</u>	<u>Remarks</u>
Oil for Low-Speed Diesels (Motor)	GOST 1519-42	M	Used for 4-cycle oil, kerosine, gasoline, and gas engines of varying degrees of power with up to 800 rpm; for new and overhauled engines that show no wear; for engines that operate under low-temperature conditions.
	"	T	Should be used primarily in 4-cycle and 2-cycle engines that show considerable wear and have large clearances between friction parts, and in engines that require a more viscous oil.

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USSR Technical Standards for Diesel Lubricating Oil (Low Speed) - 1952
 Oil for Low-Speed Diesels (Motor)

Specification	GOST 1519-42	
	M	T
Viscosity @ 50°C (122) a/		
Centistokes	45-50	62-68
Engler	6.0-6.5	8.2-9.0
Saybolt, Universal	208-231	288-316
Flash Point, (Brenken-open cup) °C, (min)	195 (383) a/	205 (401) a/
Freezing Point, °C (max)	-8 (18) a/	0 (32) a/
Carbon Residue, % (max)	0.3	0.4
Ash Content, %, (max)	0.02	0.04
Mechanical Impurities, % (max)	0.007	0.007
Water, % (max)	-----	None -----
Water-Soluble Acids and Alkalies	-----	None -----
Color, mm (min)	8	4

a. Temperature in °F.

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APPENDIX

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TEKHNICHESKIYE NORMY na NEFTÉPRODUKT

(TECHNICAL NORMS FOR PETROLEUM PRODUCTS), Moscow, 1952

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